

ENTOMOLOGICAL PROGRAM.

Insects Associated with "Mamake" (*Pipturus albidus*), a Native Hawaiian Tree.

BY OTTO H. SWEZEY.

Among the native trees and plants of the Hawaiian Islands, the scientific observer notices when on excursions to the mountain forests, that there are some species very little or not at all attacked by insects; while on the other hand, other species are very badly attacked by them. If the scientific observer be an entomological collector he soon gets to know which trees or plants are good for collecting and which ones it is not worth while trying to collect insects from. The "mamake" tree is one of the species which are very much attacked by insects. It seems to be a special favorite for quite a large number of insects; there being quite a few species even that are exclusively (or nearly so) attached to it.

During the past two or three years I have taken records and notes on insects found on "mamake," in my collecting trips to the mountains, and I think that it is quite desirable that my notes should be published. My observations have been mostly on Oahu; but to a slight extent on Maui, Hawaii and Kauai also. I have embodied in this, notes and records contributed by Mr. W. M. Giffard on Coleoptera that he has collected and reared from "mamake."

I have found this a very interesting line of entomological research, and would earnestly advise other members of the Society to take up something similar in connection with their collecting trips.

I have first treated of the insects according to their Orders beginning with the Lepidoptera, the work of which is the most conspicuous to the casual observer. Then following are lists with respect to the part of tree attacked, predators, parasites, etc.

LEPIDOPTERA.

FAMILY NYMPHALIDAE.

Vanessa tammeamea Esch.—This is the large native butterfly. Its larvae are large, green, spiny caterpillars which feed

upon the leaves. In younger stages they are blackish with white markings and sometimes mauve as well. Frequently a full-grown caterpillar of the mauve coloration is found. When the larva is quite small it cuts into the edge of a leaf and folds over the partially detached portion to form a "retreat" or hiding place. As it grows, successively larger "retreats" are formed. In searching for caterpillars they may be readily located by looking for these "retreats"; but the full-grown caterpillar is not always found in a "retreat." It is readily seen, however, by its size. This insect is almost exclusively attached to "mamake," but its caterpillars are occasionally found feeding on a few of the related trees, as *Neraudia* and *Boehmeria*.

Scotorythra rara (Butl.)—The larvae of this moth are of the usual "measuring worm" type. They are variegated with various shades of grey, brown and often green. Besides feeding on the leaves of "mamake" they also feed on the leaves of koa, guava, tree ferns, *Straussia*, *Cyrtandra*, *Pelea*, and probably many other native trees. They are often so numerous as to cause considerable defoliation.

FAMILY PLUSIADAE.

Plusia chalcites Esp.—This moth has a large green larva which crawls by a looping motion, but has one more pair of abdominal prolegs than the ordinary measuring worm. They have no particular food-plant, but feed on many cultivated plants and trees, also weeds, and many of the native trees and plants. They are often found feeding on the leaves of "mamake."

FAMILY PYRAUSTIDAE.

Phlyctaenia stellata (Butl.)—The pale whitish-green larvae of this Pyralid, when small, feed singly on the underside of the leaves, often in a groove or unevenness of the surface, or beside a rib, and protected by a web. When larger a fold is made in the leaf and sufficiently covered for protection with white silk. The larvae feed chiefly on leaves of "mamake," but I have occasionally found one on one or two closely related trees.

FAMILY GELECHIIDAE.

Thyrocopa abusa Walsm.—The larvae of this moth feed on dead twigs and vines, eating off the bark and burrowing inside

as well. They burrow in the pith of some plants, even in living plants to some extent. I have found them on recently dead branches of "mamake." They are brownish and well protected by silken tunnels.

FAMILY HYPONOMEUTIDÆ.

Hyposmocoma chilouella Walsm.—This variable species has a long slender whitish larva which bores in dead branches of "mamake." Probably they are to be found in other trees as well, but all that I have reared were from "mamake," though I have often found similar larvae in dead branches of many kinds of trees. This species is remarkable for the fact that the larval habit is different from others of the genus, it being a wood-borer and without a case; whereas, the larvae which are known of this Hawaiian genus with 177 species, live in cases, each peculiar to the species.

Hyposmocoma sp.—I have found the larval cases of some species which I was unable to rear, inside burrows of other insects in dead branches of "mamake."

FAMILY TORTRICIDÆ.

Archips postvittanus (Walk.)

Amorbia emigratella Buseck.—The green larvae of these two yellowish introduced Tortricids are leaf-folders or leaf-rollers on many kinds of plants and shrubs. I have found them on "mamake."

Epagoge infaustana Walsm.—This is a native Tortricid whose greenish larvae feed in the tips of growing shoots of "mamake"; also in folded leaves or between fastened-together leaves. I do not know of their feeding on any other plant.

FAMILY TINEIDÆ.

Opogona aurisquamosa (Butl.)—Larvae of this Tineid I have often found in decaying branches of "mamake" and beneath dead bark. They are rather general scavengers, feeding among dead leaves and in dead branches of many kinds of plants. They are often abundant in dead sugar cane and that which has been much eaten by the cane borer.

Ereunetis minuscula (Butl.)—Larvae of this Tineid have somewhat similar habits to the preceding species, though

usually to be found in drier situations. I have found them in dead and decaying branches of "mamake."

Philodoria micropetala Walsm.—This pretty little leaf-miner is very abundant on "mamake," and I think peculiar to it. I have often counted over 100 of their mines per leaf.

COLEOPTERA.*

FAMILY CERAMBYCIDAE.

Sub-family Cerambycini. Group Plagithmysides.

Plagithmysus lamarkianus P.—Males and females taken in situ at 4000 feet elevation, Kilauea, Hawaii. Not uncommon.

Callithmysus kobelei P.—Taken in situ on Tantalus, Oahu, at 1800 feet elevation. Both sexes in numbers bred from dying and wholly dead limbs gathered in same locality at 2000 feet elevation. Not at all common.

FAMILY CURCULIONIDAE.

Tribe Cryptorhynchini.

Acalles humeralis P.—Taken singly and in cop. under the dry bark at 1800 feet elevation on Tantalus, Oahu. Both sexes bred in numbers from partly dead branches and limbs gathered at 2000 feet elevation in same locality. Not common.

Tribe Cossonini.

Dryophthorus crassus Shp., *D. gravidus* Shp., *D. squalidus* Shp., *D. distinguendus*, P., *D. declivis* Shp., *D. modestus* Shp., *D. insignis* Shp., *D. insignoides* P., *D. oahuensis* P.—Both sexes of each of these species excepting *oahuensis*, taken in situ under decaying bark of *Pipturus* on Tantalus at 1300 to 2000 feet elevation. The same species also bred from half dead branches and trunks of *Pipturus*. Many of the species may be considered ubiquitous and are by no means confined to *Pipturus*, unless it be *oahuensis*, which itself is somewhat uncommon and not at all abundant on this tree. Only half a dozen specimens of

*These notes and records of Coleoptera contributed by Mr. W. M. Giffard. They were obtained on his collecting trips since 1904. All breeding was done at his Tantalus bungalow, at 1350 feet elevation.

oahuensis were obtained during five years collecting on Tantalus, Oahu, and these were always in the live wood of *Pipturus* where it joins that which is dying. Two specimens of *oahuensis* were bred from half dead *Pipturus* wood. It has not been taken on any other island. All the other species of *Dryopthorus* named were taken and also bred in large numbers on Oahu; but it has not yet been actually determined whether all these species are peculiar to this island.

FAMILY PROTERHINIDAE.

Proterhinus vestitus P. and *P. blackburni* P.—Both common species and not altogether attached to *Pipturus*. Bred from dying wood of *Pipturus* gathered on Tantalus, Oahu, at 1800 to 2000 feet elevation. Also taken on Tantalus in situ under dead bark of *Pipturus*.

FAMILY ANOBIIDAE.

Xyletobius walsinghami Perkins—A few specimens bred from a trunk of dying tree on Tantalus. The largest species of the genus occurring in these Islands.

FAMILY CIOIDAE.

Species of *Cis* and *Apterocis* were taken from under dead bark of *Pipturus* on Tantalus, and also bred from the dying wood gathered in the same locality at 1800-2000 feet elevation.

FAMILY NITIDULIDAE.

Eupetinus impressus (Shp.)—Under decayed bark.

FAMILY ELATERIDAE.

An undetermined species under decayed bark; also pupae in the rotting wood.

FAMILY COLYDIIDAE.

Antilissus aper (Shp.)—Under dead bark of *Pipturus*, at 2000 feet elevation on Tantalus. Not uncommon under dying or dead bark of *Bobea* and *Straussia*.

FAMILY CARABIDAE.

Two or three species taken from hollow portions of the trunk and limbs of *Pipturus* on Tantalus at 1800-2000 feet elevation. Probably in hiding or in search of prey.

In addition to the Coleoptera recorded by Mr. Giffard, I have collected the following as occurring incidentally:

Cryptamorpha desjardinsii Guer.

Rhizobius ventralis Er.

Cryptolaemus montrouzieri Muls.

Coelophora inequalis (Fab.)

Platyomus lividigaster.

The four latter are Coccinellids, and were either in hiding or in search of prey; the first two feeding on *Pseudococcus citri*.

HEMIPTERA.

FAMILY PYRRHOCORIDAE.

Metrarga nuda White—Found inside dead branches that are more or less split up, or burrowed by other insects.

FAMILY NABIDAE.

Reduviolus truculentus Kirk.—Found on the living branches and foliage, where it is predaceous on other insects occurring there.

Reduviolus lusciosus (White)—Sometimes found on lower branches or on young trees. Has predaceous habits like the preceding species.

FAMILY ANTHOCORIDAE.

Lasiochilus decolor (White)—A small, dark brown bug found in dead branches and under bark. Probably predaceous.

FAMILY MIRIDAE.

Tichorhinus iolani (Kirk.)—This small green bug is often very abundant, feeding and breeding on the foliage. Probably attached to this tree.

Tichorhinus kanakanus (Kirk.)—Slightly larger than the preceding and not so common.

I have a red Capsid, unidentified, taken from *Pipturus*.

FAMILY JASSIDAE.

Nesophrosyne pipturi (Kirk.)

Nesophrosyne ponapona (Kirk.)—Two species very abundant on "mamake" and probably attached to it.

FAMILY ASIRACIDAE.

Nesosydne pipturi (Kirk.)—This pretty little leafhopper very common; probably attached to this tree.

FAMILY COCCIDAE.

Pseudococcus citri (Rossi)—This mealy-bug often seen on the leaves, but not common.

Saissetia hemisphericum (Targ.)—An occasional specimen on the twigs.

PARASITIC HYMENOPTERA.

FAMILY ICHNEUMONIDAE.

Echthromorpha fuscator Fab.—Parasitizes the chrysalis of *Vanessa lamneamea*.

Limnerium blackburni Cam.—Parasitizes the larvae of *Phlyctenia stellata*.

FAMILY BETHYLIDAE.

Scleroderma sp.—Probably a new species near *kaalae* Ashm. Parasitizes the larvae of *Hyposmocoma chilonella*.

FAMILY DRYINIDAE.

Gonatopus perkinsi Ashm.—Parasitizes *Nesosydne pipturi*, also other related leafhoppers. The parasitized leafhopper is recognized by the conspicuous black wart-like body on its abdomen.

FAMILY EUPELMIDAE.

Omphale metallicus Ashm.—I have reared this little parasite from the leaf-miner, *Philodoria micropetala*. It is parasitic also on other leaf-miners and other small Micros.

FAMILY TRICHOGRAMMIDAE.

Pentarthron flavum Perkins—Parasitic in the eggs of *Vanessa tammeamea*. It also parasitizes the eggs of many species of moths.

PARASITIC DIPTERA.

FAMILY TACHINIDAE.

Chaetogaedia monticola (Bigot)—Parasitizes the caterpillars of *Scotorythra rara* and many other caterpillars.

FAMILY PIPUNCULIDAE.

Pipunculus swezeyi Perkins—Parasitic on the nymphs of leaf-hoppers. Probably attacks *Nesosydne pipturi*, though I never have reared it.

MISCELLANEOUS.

Odynerus spp.—I have found nests of these wasps filled with caterpillars in hollow, dead twigs, but have not reared the wasps to maturity to identify them. There are probably several species, as: *O. nigripennis*, *O. montanus*, *O. pseudochromus*, *O. pseudochromoides* and *Nesodynerus rudolphi*.

Nesoprosopis spp.—Several species of the native bees also nest in dead branches.

Ants—Several species found nesting in dead branches, or running up the trunks in search of prey.

Calotermes castaneus Burm.—Nests in the dead branches.

Cricket—A small species, taken on bark, Tantalus, 1800 feet elevation (W. M. G.).

Oliarus sp.—Taken at Mamawili, Oahu, 800 feet elevation (W. M. G.).

- Eucesta ammonae* Fabr.—Observed on bark of tree at Maunawili, Oahu, 800 feet elevation (W. M. G.).
- Sciara molokaiensis* Grims. (?)—Dipterous larvae (probably this *Mycetophillid*) observed under rotting bark of *Pipturus*, Tantalus, 1500 feet elevation (W. M. G.).
- Earwig—In rotten branches, in search of prey.
- Psocids—Several undetermined species, collected from the leaves and branches.
- Psyllid—An undetermined specimen. An incidental capture.

INSECTS ATTACHED TO PIPTURUS, OR NEARLY SO.

- LEPIDOPTERA—*Vanessa tammeamea*.
Phlyctaenia stellata.
Epagoge infaustana.
Philodoria micropetala.
- COLEOPTERA—*Calithmysus koebelei*.
- HEMIPTERA—*Reduviolus truculentus*.
Tichorhinus iolani and *kanakanus*.
Nesophrosyne panapona and *pipturi*.
Nesosydne pipturi.

INSECTS ATTACKING THE LIVING TREE.

FEEDING ON THE LEAVES—

- Vanessa tammeamea*.
Scotorythra rara.
Plusia chalcites.
Phlyctaenia stellata.
Archips postrittanus.
Amorbia emigratella.
Epagoge infaustana.
Philodoria micropetala.
Tichorhinus iolani and *kanakanus*.
A. red Capsid.
Nesophrosyne panapona and *pipturi*.
Nesosydne pipturi.
Pseudococcus citri.

BORING IN GREEN TWIGS—

- Epagoge infaustana*.

ON LIVING BARK—

- Saissetia hemisphericum*.

INSECTS ATTACKING DEAD OR DYING TREES.

IN TRUNK AND BRANCHES—

*Plagithmysus lamarkianus.**Callithmysus koebeli.**Acalles humeralis.**Dryophthorus gravidus, squalidus, distinguendus, declivis, modestus, insignis, insignoides, crassus and oahuensis.**Proterhinus vestitus, and blackburni.**Xyletobius walsinghami.**Eupetinus impressus.**Hyposmocoma chilonella.**Calotermes castaneus.*

FEEDING ON FUNGUS ON OR BENEATH BARK.

Cis spp.*Apterocis* spp.

INSECTS IN SEARCH OF PREY.

COLEOPTERA—

Carabid beetles.

*Rhizobius ventralis.**Cryptolaemus moutrouzieri.**Coelophora inequalis.**Platymus lividigaster.*

HEMIPTERA—

*Metrarga nuda.**Reduviolus truculentus, and lusciosus.**Lasiochilus decolor.*

MISCELLANEOUS—

Ants.

Earwig.

Staphilinid.

PARASITES—

*Echthromorpha fuscator.**Limnerium blackburni.**Scleroderma* sp.*Gonatopus perkinsi.**Omphale metallicus.**Pentarthron flavum.**Chaetogaedia monticola.**Pipunculus swezeyi.*

Specimens were exhibited, and in the discussion which followed the paper, Mr. Giffard stated that between 1904 and 1906 he had paid special attention to beetles attached to "Mamake," but could not with any certainty state that more than one species was absolutely restricted to that tree, as far as the island of Oahu is concerned. He referred particularly to *Callithmysus kobelei* which he had bred from Mamake on several occasions. A small species of *Acalles*, one of *Proterhinus* and one or more of *Cis* he had also bred, but was not sure but that these were also attached to other hosts. On Hawaii he had collected *Plagithmysus lamarkiannus* from *Pipturus*, as had other collectors, but had no opportunity to breed it from the tree.

Mr. Giffard exhibited a spider's nest between two koa leaves which had been pre-empted by the mud nest of *Odynerus* that, in turn, had been parasitized by *Eupelmus*. He also exhibited the cells and larvae of *Odynerus*, together with a series of *Eupelmids* that had emerged from them.

Mr. Terry exhibited a male *Stylops Neocholax jacobsoni* Meij. which he had caught at night in Java, and stated that there was no previous record of a Stylopid caught at night.

Mr. Leckenby (a visitor present, who had recently returned from New Zealand) stated that in New Zealand there was a flycatcher, *Rhipidura flabellifera*, that might prove of value in Hawaii. He had observed a large spider in Fiji that fed on Japanese beetles that might also be introduced.

APRIL 6TH, 1910.

The sixty-second regular meeting of the Society was held in the usual place.

ENTOMOLOGICAL PROGRAM.

List of the Aphidae of the Hawaiian Islands.

BY D. T. FULLAWAY.

[Microscope Slides of Specimens Exhibited.]

The following list is supplementary to that published by Mr. Kirkaldy in 1908.* A synopsis of the group appears in

*Proceedings Hawaiian Entomological Society, I, Part 5, p. 206.